

In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

IN THE CLAIMS

Claims 1 to 6 (cancelled).

7. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

In re Patent Application of:
SHIER ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path, the current spreading region having an index guide formed therein; and

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector
~~as claimed in claim 1 further including an index guide formed in the current spreading region.~~

8. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path; and

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector, the third mirror region having a notch formed therein
~~as claimed in claim 1 further including a notch formed in the first mirror region to limit a diameter to approximately a primary mode of operation.~~

9. (currently amended) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

a second cladding region positioned on the active region and including a high electrical resistance implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region;

a current spreading region positioned on the second mirror region;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path;

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector;
and,

~~as claimed in claim 1 further including a tunneling junction.~~

10. (original) A vertical cavity surface emitting laser comprising:

a first mirror region forming a first distributed Bragg reflector;

In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

a first cladding region positioned on the first mirror region;

an active region positioned on the first cladding region;

a second cladding region positioned on the active region and including a high electrical resistance ion implanted region positioned to define a current path;

a second mirror region positioned on the second cladding region including from one to five pairs of alternate mirror layers of a first semiconductor material with a first index of refraction and a second semiconductor material with a second index of refraction;

a current spreading region including a heavily doped semiconductor layer positioned on the second mirror region;

an index guide formed in the current spreading region, the index guide defining a lasing cavity;

a first electrical contact in electrical communication with the current spreading region and a second electrical contact positioned to conduct electrical current in circuit with the first electrical contact through the current path;

the current spreading region and the second mirror region cooperating to produce substantially uniform current distribution in the current path; and

In re Patent Application of:
SHIEH ET AL.
Serial No. 10/715,165
Filed: November 17, 2003

a third mirror region positioned on the current spreading region, the second and third mirror regions cooperating to provide a complete distributed Bragg reflector.

11. (original) A vertical cavity surface emitting laser as claimed in claim 10 wherein the third mirror region includes a plurality of pairs of one of alternate semiconductor layers and alternate dielectric layers.

Claims 12 to 26 (cancelled).

BEST AVAILABLE COPY